

PART III

Physical Description

Physical Regions of Washington

On the basis of surface features, Washington may be divided into eight general regions. Agricultural settlement is influenced by factors of topography, climate, soil, forest vegetation and water resources distinctive to each of the physiographic regions. Each has become a different type of farming area as settlers have learned to adapt crops and livestock to the conditions, or have improved limitations through drainage or irrigation.

Coastal Plains

A narrow, sandy plain with shallow bays, tidal flats, stream deltas and low headlands lies between the coastline and the Coast Range. It extends from the Columbia River mouth almost to Cape Flattery, being widest and lowest in the Grays Harbor and Willapa Bay districts. The climate is mild and damp with a long growing season, but it is too cool, cloudy and wet for most crops. Originally this area was covered with heavy forests and much is now covered with woodlands. Lumbering and manufacture of wood products is the main industry. Farming is largely of the livestock and dairying type on low uplands and drained areas in the lower Chehalis River Valley. Cranberry growing is important and well-adapted to numerous, boggy areas in the Grays Harbor and Willapa Bay sections. The shallow bays are also used for oyster culture. Fishing is common in the rivers and coastal banks.

Coast Range

The Coast Range is an uplifted area of sedimentary and metamorphic rocks divided into the Olympic Mountains and the Willapa Hills. The Olympics tower to nearly 8,000 feet in a dome-like structure, carved deeply by rivers. These mountains have the heaviest precipitation in the state. Snowfields and heavy forest cover the mountains. Most of the wilderness area is within the Olympic National Forest and Olympic National Park, being managed for recreation, wildlife and timber. Farm settlement is limited to some foothill river plains and coastal terraces such as the Dungeness and Port Angeles districts along the Strait of Juan De Fuca. Here in the lee of the mountains, rainfall is moderate and irrigation is practiced by some livestock farmers. The Willapa Hills country is wet, heavily forested and carved into numerous narrow valleys. Logging is the main industry, combined with livestock farming in the upper Chehalis River Valley and along the banks of the Columbia River. Wet climate, hilly topography and the difficulty of clearing stump land retards agriculture.

Willamette-Puget Sound Lowland

A broad lowland, described as a trough or valley, lies between the Coast Range and the Cascade Mountains. The northern part is the Puget Sound Lowland which has been glaciated and occupied by the sea in the lowest section. The continental glacier reached slightly south of Olympia. Under a warming climate it melted and geologists believe it receded about 25,000 years ago, leaving an infertile plain of moraines and outwash gravels, sands and clays known today

as the Puget Glacial Drift Plain. Its rolling surface has numerous lakes and bogs. Most of the major cities--Seattle, Tacoma, Everett, Bellingham and Olympia--have been built on moraines bordering the Sound. Rivers, such as the Nooksack, Skagit, Snoqualmie, White and Puyallup, built up deltas and flood plains over the older gravelly plains. These narrow valleys are more fertile than the older glacial plains and support numerous small dairy, vegetable and berry farms. Most of the gravelly areas are wooded with a second-growth forest and are used for pastures. In the southern part of the Willamette-Puget Sound Lowland, there are two large valleys--the Cowlitz and Chehalis. They drain a low, hilly area with several flat prairies and bottom lands.

Agriculture is handicapped by poor drainage and flooding of the river deltas and plains, by heavy winter rainfall, by cloudy but dry summers, by coarse, gravelly upland soils and by densely wooded land which is costly to clear. Advantages are mild climate and a location close to major markets for farm products such as milk, poultry and vegetables.

Cascade Mountains

The Cascades are a wide and high topographic and climatic barrier which separates western and eastern Washington. The range is made up of sedimentary, igneous and metamorphic rocks which have been carved by glaciers and streams. High, isolated volcanic cones of lava such as Mt. Adams (12,307 feet), Mt. Rainier (14,408 feet) and Mt. Baker (10,791 feet) appear upon the older Cascade rocks. The Cascade crest varies between 3,000 and 10,000 feet and is higher and more rugged in northern Washington. Roads and railroads have been built across its lower passes in central and southern Washington. The Columbia River has cut a deep gorge and the lowest pass through the barrier. The western slope is wet and heavily forested with Douglas fir. The eastern slope is drier with a less-dense pine forest. Nearly all classified as forest land, most of the area is in Federal ownership in five national forests and Mount Rainier National Park. Tree fruit farming in the eastern slope valleys of Wenatchee, Chelan, Methow, Naches and the Columbia Gorge is most important. Sheep and cattle summer grazing on alpine grasslands is another use. Deep western slope valley bottoms such as the Skagit, Snoqualmie, Nisqually, Cowlitz and Lewis also contain livestock farms. The area is vitally important as a source of timber. Steep terrain, wet climate, short growing seasons and heavy forest vegetation are main handicaps for agriculture.

Columbia Basin

A low plateau of old lava rocks covered with stream and wind-deposited soils extends in a series of plains, ridges, coulees and hills from the Cascades to the eastern Washington border. The area is basin-like in structure, being higher around its margins and sloping inward to low and level central plains. It has been sharply eroded by the Columbia River and its interior tributaries, the Snake, Yakima, Palouse and Spokane Rivers. The basin has sub-areas created by crustal movements and erosion.

The Yakima Folds are a series of hilly ridges extending from the Cascades eastward into the lower part of the basin. The Yakima and Columbia Rivers have cut gaps through the ridges and built up plains in the troughs between them. The rich, alluvial plain of the Yakima River is an important irrigated valley.

The Waterville Plateau is a tableland of thin soils overlaying basaltic rock at an elevation of 2,500 to 3,000 feet. It has gorges cut by the Columbia River and ancient glacial outwash streams once flowing in Moses and Grand Coulees. It is too high for irrigation and is used for dryland grain and livestock farming. The high plain is often called the Big Bend country.

The Channelled Scablands is a belt of dry terrain carved by ice-age rivers into a series of coulees. Bare rock is exposed in the coulees. Small plateaus between the old river channels have thin soils used for dryland farming. The Grand Coulee of this region has been developed into a major irrigation reservoir.

The Palouse Hills consist of fertile deposits of wind-blown soil overlaying basaltic lava flows. After being deposited in large dunes, the formation was reshaped by streams into an intricate pattern of low, rounded hills which are tilled for wheat, barley and legumes. The hills receive 16 to 25 inches of rainfall and have deep, porous and fertile soils. It is one of the richest farming areas of the Pacific Northwest.

The Central Plains are low and relatively level expanses of soil, deposited by old streams crossing the Channelled Scablands and later by the flooding of the Yakima, Columbia, Snake and Walla Walla Rivers. Climate is desert-like (6-12 inches of precipitation per year). The lower lands of the area, the Quincy and Pasco Basins and the Walla Walla Valley, are irrigated. Quincy Basin is a new irrigation area watered by Grand Coulee Dam.

Agricultural handicaps in Columbia Basin regions are mainly found in its dry, continental climate. Large irrigation systems build since 1900 have overcome much of the need for water on rich valley and basin soils. Dryland farming in higher areas is practiced widely, although occasional variations in rainfall, lack of snowfall, winter-kill, water and wind erosion inflict damage to field crops and to livestock ranges.

Okanogan Highlands

A portion of the Rocky Mountains, consisting of well-eroded old granites, lavas and sedimentary rocks, extends across north central Washington. These are the Okanogan Highlands, the state's richest mineral area. Summit levels reach 4,000 to 5,000 feet with peaks exceeding 7,000 feet. Prominent north-south valleys are occupied by irrigated tree fruit and livestock farms. These are the Okanogan, Sanpoil, Kettle and Colville Valleys. The Columbia River Gorge through the Okanogan Highlands is occupied by the large man-made lake behind Grand Coulee Dam--Roosevelt Lake. High and wetter portions are forested with pine and larch, and are managed for timber and for livestock ranges by the United States Forest Service and the Bureau of Indian Affairs. Cold winter temperatures, short growing seasons, dry valley climates and distance from markets are farming handicaps.

Selkirk Mountains

The Selkirks, a range of the Rocky Mountain system, extend into the northeast corner of Washington. The rocks are old mineralized granites and metamorphics reaching elevations of over 7,000 feet. The Pend Oreille River Valley

at the base of the Selkirks is an agricultural area of narrow bottom lands settled by livestock farmers. Nearly all of the uplands are in Kaniksu National Forest. While climate is cool and growing seasons are short, the Pend Oreille Valley has an advantage of being closely located to the Spokane metropolitan market area.

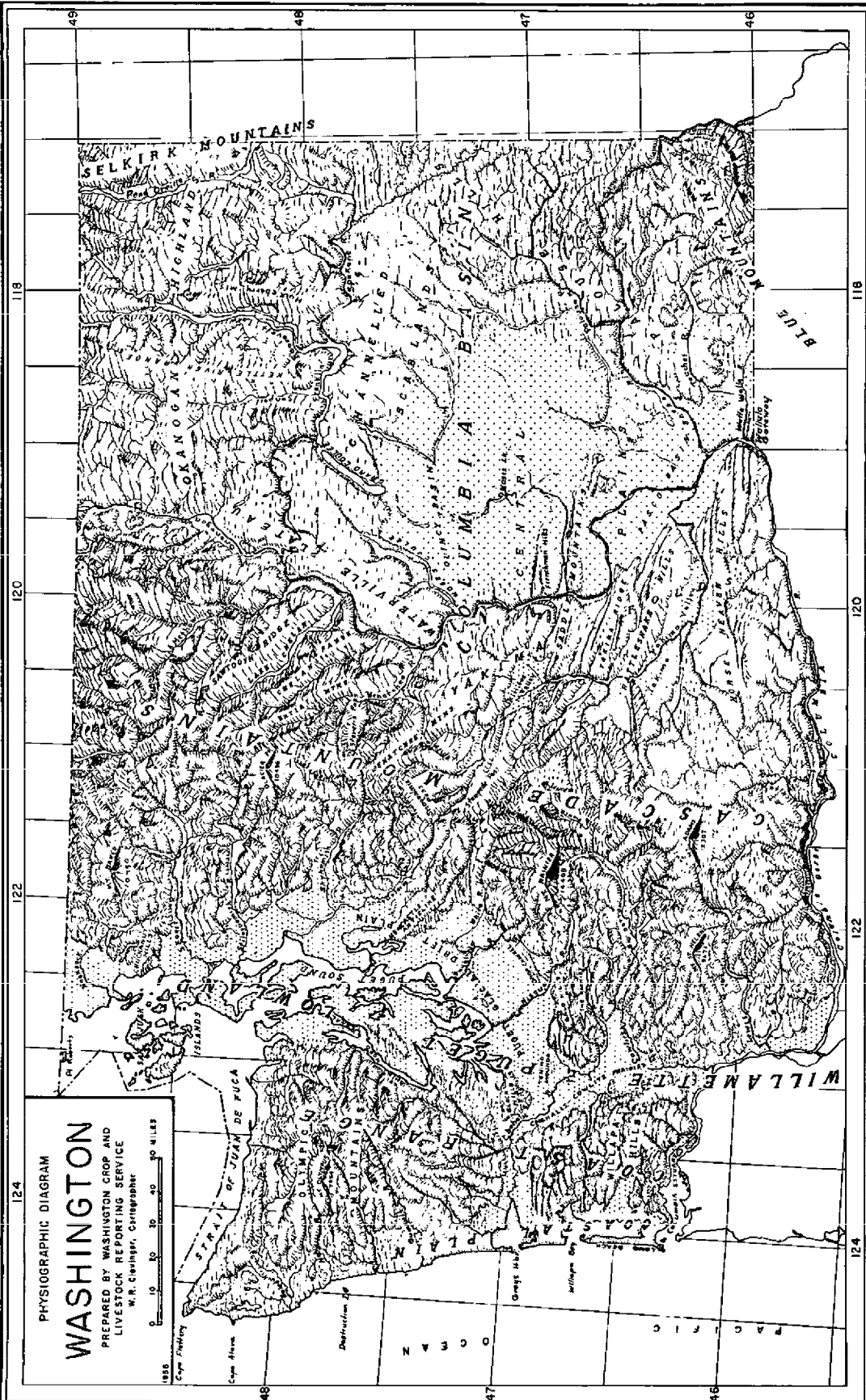
Blue Mountains

The Blue Mountains are an uplifted and eroded plateau extending into the southeastern corner of Washington. The strata are mainly ancient crystalline rocks which contain some minerals. The highest point of the mountains in the Washington section is Diamond Peak (6,401 feet), on the divide between the Grande Ronde, Tucannon and Touchet Rivers. These rivers, and the Walla Walla River, have cut valleys into the plateau. Extensive pine forest and grassland areas are in the highlands within Umatilla National Forest, where rainfall is 30 to 40 inches. The Snake River has cut a deep valley and gorge across the lower parts of the mountains. The area is well developed agriculturally around its northern foothills where wind-blown soils are deep and irrigation systems are used. The Walla Walla and Tucannon Valleys are rich grain, legume and livestock areas grown under irrigation and by dry farming. Grazing is an important use of the high lands by livestock ranchers in the upper valleys.

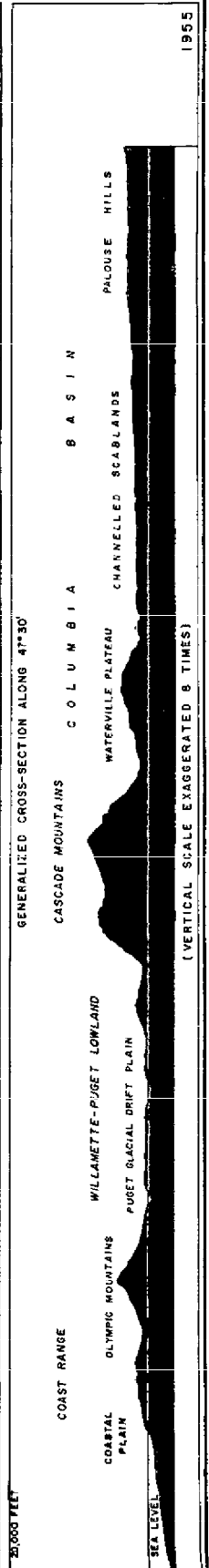
Topography of Garfield County

Garfield County consists of three general topographic regions with elevations varying from 670 feet along the Snake River to 6,379 feet at the summit of Diamond Peak in the Blue Mountains. Topographic conditions limit land area suitable for agriculture. About 27 percent of the county area is too rough for agriculture.

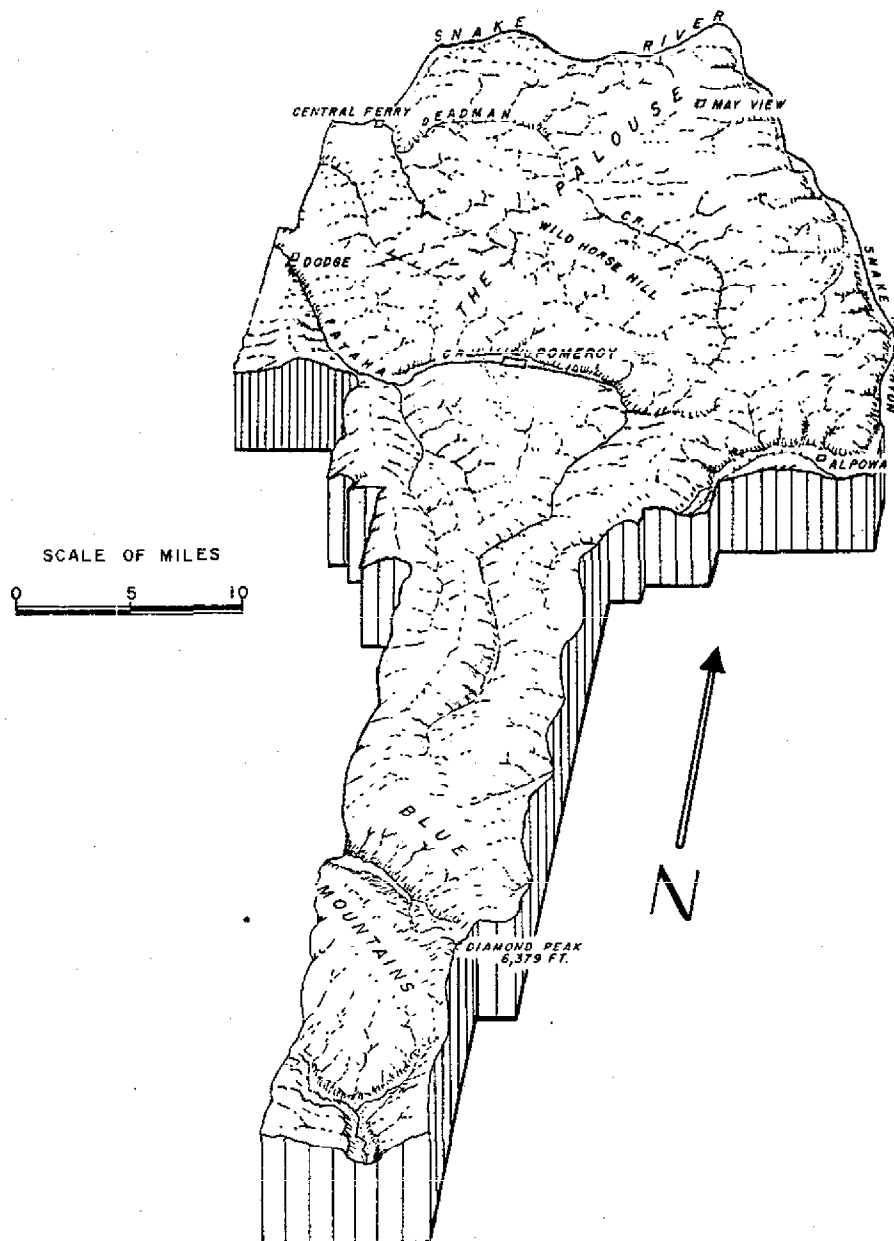
The lowest region in elevation is the Snake River canyon in the north. The Snake River has eroded a deep canyon across the basalt bed rock of the Palouse Hills and the Blue Mountain foothills. The gorge is about 3 miles wide and the sides slope up steeply to the Palouse Hills plateaus. A second region is the Palouse Hills plateau of northern Garfield County which ranges from 2,000 to 3,800 feet and contains most of the cropland. The plateau has flat tablelands and rolling plains. Pataha and Deadman's Creeks have cut valleys 500 to 1,000 feet deep in the plateau. Pomeroy, the principal town, is on a valley floor at 1,965 feet elevation whereas the plateaus and flats surrounding it are 2,200 to 3,500 above sea level. The third general region is the Blue Mountains in the southern third of the county. This region is rough and well-dissected by numerous tributary streams of the Tucannon River, Deadman's Creek and Alpowa Creek. It contains several accessible high plateaus and tablelands such as Unfried Ridge, Abels Ridge and Knotgrass Ridge in the Peola vicinity at 3,900 to 5,500 feet. Topography is rocky and rugged in the southern extremity of Garfield County, reaching an elevation of 6,379 feet on Diamond Peak, one of the highest points in the Blue Mountains and southeastern Washington. This highland is deeply cut by tributary streams of the Tucannon and Grande Ronde Rivers and smaller drainages such as Asotin, Pataha, Charley and Alpowa Creeks. Most of the rough land is under public ownership and is used for grazing or timber management under permit of the Commissioner of Public Lands, State of Washington and the Umatilla National Forest of the U. S. Forest Service. The higher portion of the Blue Mountains is under permanent forest management by the federal and state governments and private owners.



PHYSIOGRAPHIC DIAGRAM
WASHINGTON
 PREPARED BY WASHINGTON CROP AND
 LIVESTOCK REPORTING SERVICE
 W. R. Clevinger, Cartographer



TOPOGRAPHIC DIAGRAM
GARFIELD COUNTY



WASHINGTON CROP AND LIVESTOCK REPORTING SERVICE

W.R. CLEVINGER.

Land Classification and Soils

Land in Garfield County is broadly divided into seven classes. About 55 percent of the county area is classified as good to fair Class I, II, III and IV lands suitable for growing dryland and irrigated crops of grain, green peas and alfalfa. All of the southern portion, or the narrow southern panhandle of the county, is within the Blue Mountains. Rough terrain in the mountains and in the bluffs of the Snake River canyon reduces the amount of available cropland. Farm lands range from about 650 feet on the river bars along the Snake River to 3,800 feet on Pataha Flat south of Pomeroy.

Soils have not been analyzed and mapped in detail. A general reconnaissance soil map shows that Garfield County's main agricultural areas contain one major and highly productive soil series common to southeastern Washington ^{1/}. These are the Palouse soils, noted for growing wheat, barley and peas. They make up the Class I and II lands of the rolling hills and plateau plains in the basins of Pataha and Deadman Creeks of northern Garfield County. Palouse soil is loess--a wind deposited soil--formed under low rainfall conditions and under bunch grassland. It is a fine silt loam, deep and easily cultivatable, rich in essential minerals and highly retentive of moisture. Wheat, barley, peas and alfalfa yield well on this soil. There are over 55,000 acres of Class I Palouse soil land in northern Garfield County at elevations of 2,000 to 3,800 feet. Most of these soils are in gentle hills and ridges on which tractors and combines can operate.

Stream deposited soils of sandy and gravelly loams lie along Pataha and Deadman Creeks and in the bars in the floor of the Snake River canyon. These soils are of the Snake River, Ellisfords and Pasco series of river alluviums. They are irrigated with sprinklers and ditches and are used for hay and fruit.

Less-productive mountain or rocky soils making up Class V, VI and VII lands of Garfield County are the sloping benchlands, gullies and rock outcrop areas near the Snake River and the rough terrain of the Blue Mountain range. The Snake River canyon has steep sides rising from 670 feet elevation at the river bank to 2,700 feet within a distance of one to two miles. This canyon has been eroded through deep beds of basalt underlying the loess soil deposits of the Palouse Hills and Blue Mountain foothills. South of Pomeroy and Columbia Center, the Blue Mountains rise abruptly.

Climate

Climatic conditions vary considerably with changes in elevation. Garfield is in the Palouse-Blue Mountains climatic division of Washington. It has the dry, continental climate which extends from the Cascades eastward to the ranges of the Rocky Mountains. The Blue Mountains have a local highland climate which is cooler and more humid than the Snake River lowlands surrounding them. Most of the agriculture in Garfield County is in the dryland belt north of Pomeroy, where precipitation is under 20 inches and where the summers are hot and dry

^{1/} U. S. Department of Agriculture. Atlas of American Agriculture, 1936. pp. 80-81. Map plate pages 28-30 of soils of Pacific Northwest. See also Otis W. Freeman, Howard H. Martin, The Pacific Northwest an Overall Appreciation, 1954. pp. 124-127.

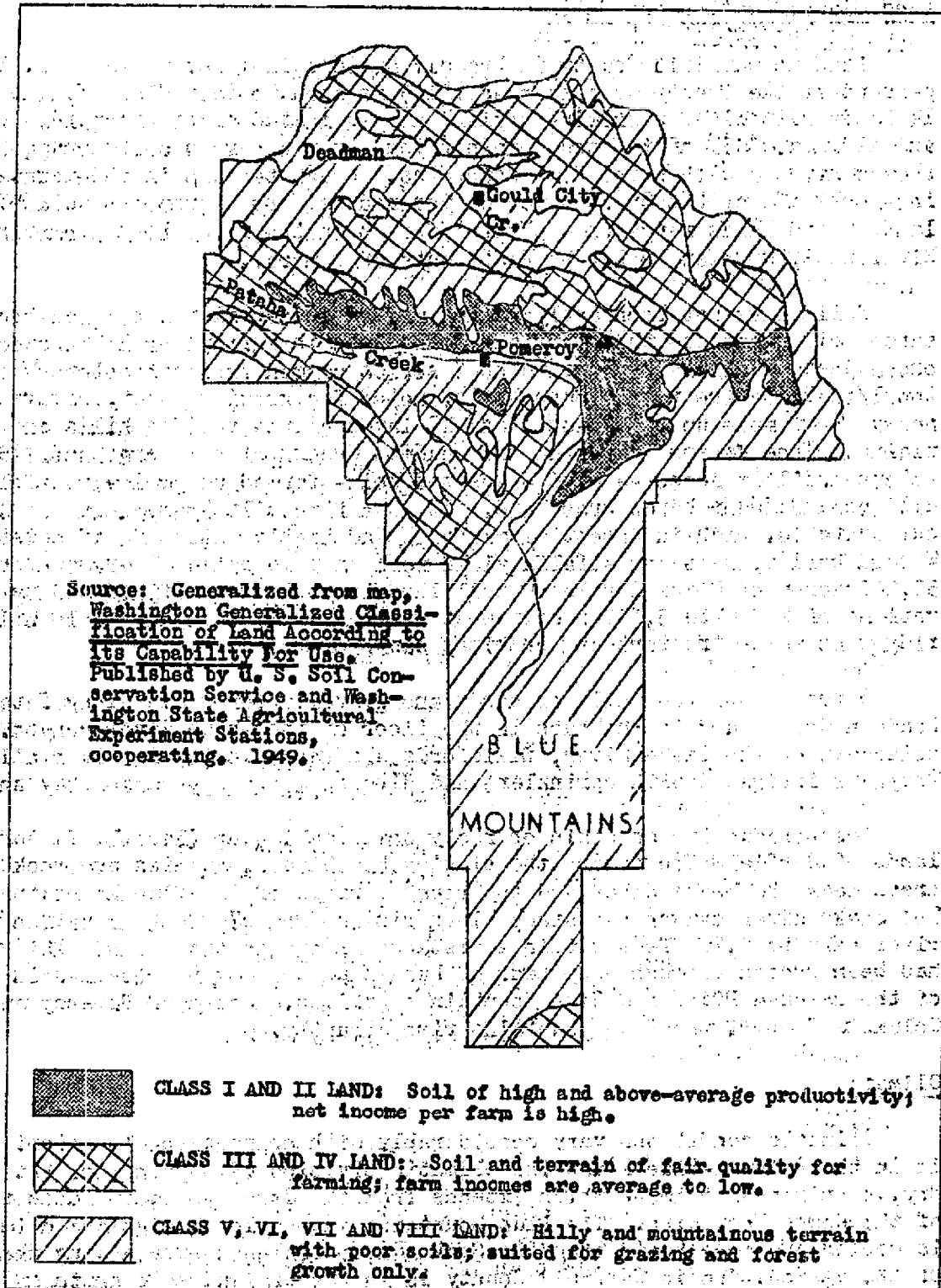


Figure 6.- General Quality of Land For Farming in Garfield County

and the winters cool and humid. Field crops are adapted to a range of temperatures and growing seasons which are associated with transitions in elevations from 700 feet to over 3,300 feet in some wheat-growing districts.

Precipitation varies from about 10 inches in the Snake River Valley floor on the northern edge of Garfield County to 40 inches and more in the higher Blue Mountains. In the primary crop growing belt throughout the valleys of Pataha and Deadman Creeks and in the hills surrounding Pomeroy, precipitation ranges from 16 to 20 inches. Pomeroy has an average of nearly 17 inches per year recorded over a period of 42 years. In this region, grain and pea crops are grown under the summer fallow system to accumulate top soil moisture. Most grains are sown in the fall to take advantage of winter rainfall and a protective snow cover. Westerly winds from the Pacific drop considerable moisture during nine months of the year as they rise over the Palouse Hills and Blue Mountains. Moderate snowfall comes to most of the county during midwinter.

Temperatures in the agricultural area surrounding Pomeroy average slightly above freezing in midwinter and reach an average of about 70 degrees in midsummer. Records taken at Wawawai in the Snake River Valley canyon show that the lowlands bordering the river at 700 feet are considerably warmer than at Pomeroy at 1,890 feet. During the midsummer growing season, Weather Bureau observations show that at Pomeroy temperatures are in the 80's and 90's during midday and about 60 to 65 at night.

Table 6.- Temperatures For Selected Stations, By Months
Garfield County

Station and Elevation in Feet	Average Temperatures (in degrees Fahrenheit)												Annual Average
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Pomeroy (1,890)	34.0	42.6	43.0	50.1	57.0	63.2	71.2	69.6	60.8	51.7	51.1	34.2	50.7
Wawawai ^{1/} (700)	34.4	38.6	48.0	53.8	62.8	67.4	76.6	64.8	66.3	57.7	43.0	38.0	55.1

^{1/} Wawawai is on the Snake River boundary of Whitman and Garfield Counties.
Located in Whitman County.

Source: U. S. Weather Bureau, Climatological Data,
Washington, Annual Summary, 1956

Table 7.- Temperature Extremes, Dates of Killing Frost

Station and Elevation in Feet	Temperature Extremes Recorded (degrees Fahrenheit)		Killing Frost Average Dates	
	Coldest	Hottest	Last in Spring	First in Fall
Pomeroy (1,890)	-24	112	May 3	October 6
Wawawai ^{1/} (700)	-1	100	May 1	October 24

Source: U.S. Weather Bureau, Climatological Data
Washington.

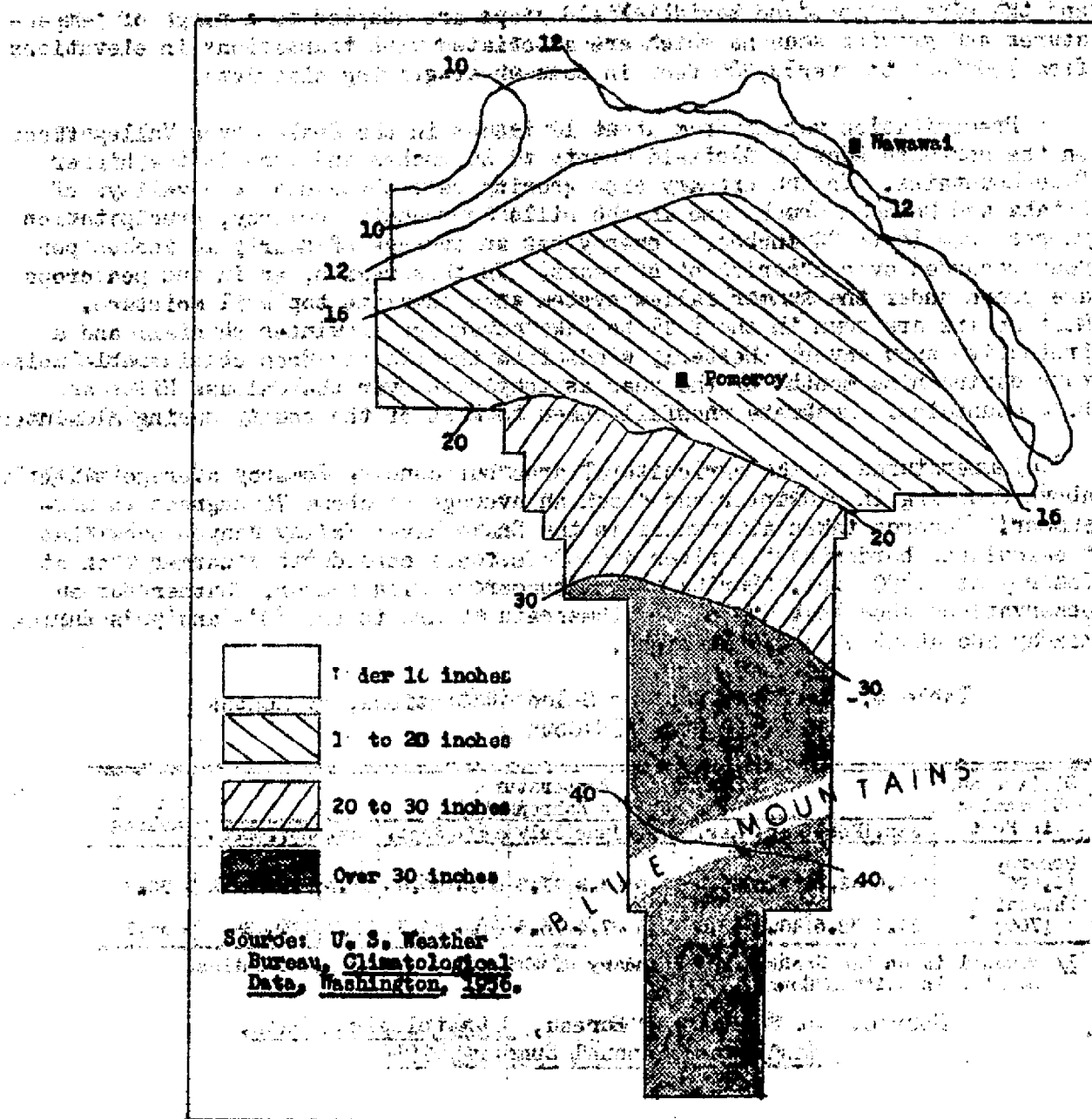


Figure 7.- Distribution of Precipitation
Garfield County

Table 8.- Precipitation for Selected Stations by Months
Garfield County

Station and Elevation in Feet	Average Monthly Precipitation (in inches)												Annual Total (inches)
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Pomeroy (1,890)	2.06	1.64	1.68	1.24	1.24	1.57	.37	.28	.90	1.53	1.92	2.34	16.77
Nawawai 1/ (700)	2.33	1.66	1.32	1.24	1.23	1.48	.32	.22	1.13	1.78	2.39	2.72	18.66

1/ Nawawai is located in Whitman County near the boundary of Garfield County.

Source: U.S. Weather Bureau, Climatological Data, Washington, Annual Summary, 1956

Records at Pomeroy over a period of several years show that temperature extremes occur and that the growing season is about 140 days long at that locality. Other localities in Garfield County vary from this 140 day average depending on elevation. In the primary agricultural region of the Pataha Creek Valley surrounding Pomeroy, temperatures as cold as 24 degrees below zero and as high as 122 have been recorded. In this area the last killing frosts of spring generally come about May 1 and the first in autumn is in early October.

Forests and Other Land Resources

Southern Garfield County contains important forest resources in the Blue Mountain region. There are 78,000 acres of forested land, making up about 17 percent of the entire county area.^{1/} Umatilla National Forest contains 67,000 acres of this total. About 10,000 acres belong to farmers and other private owners and about 1,000 acres are in state ownership. Important commercial timber species are Ponderosa pine on lower elevations and western larch, Douglas fir, white fir, lodgepole pine and white pine on higher slopes. About half of the timber is of the higher sub-alpine types. Umatilla National Forest has a total area of about 96,000 acres within Garfield County, about 20,000 acres of which is rocky noncommercial forest land. In recent years the commercial sawlog cut in the county has been between 1 million and 5 million board feet per year. Most sawlogs are trucked to lumber mills outside the county at Dayton and Lewiston, Idaho.

The mountain land is valuable for multiple uses such as cattle and sheep grazing, watersheds and as recreational areas for campers and hunters. In a recent hunting season, Washington State Game Commission reports recorded that cropland and range areas yielded 3,300 pheasants, 2,000 Hungarian and Chukhar partridges. In the Blue Mountains hunters bagged 200 deer and 75 elk. Primitive and wildland areas also yielded catches of wild fur pelts such as muskrat, mink and marten.

^{1/} U. S. Forest Service, Pacific Northwest Forest Experiment Station, Portland, Oregon. Forest Statistics for Walla Walla, Columbia, Garfield and Asotin Counties, Washington.

Table 9.- Columbia County's Rank Compared With
Other Washington Counties

Item Compared	Rank	Quantity	Year
<u>General</u>			
Land area.....	33	456,960 acres	1954
Number of farms.....	37	300 farms	1954
Land in farms--percent.....	7	76.3 percent	1954
Average size of farms.....	5	1,163 acres	1954
Cropland harvested.....	13	112,747 acres	1954
Rural farm population.....	34	1,313 persons	1950
Total county population.....	39	3,204 persons	1950
<u>Cash farm income</u>			
Value of all farm products sold...	20	8,652,518 dollars	1954
Value of livestock sold.....	34	655,081 dollars	1954
Value of crops sold.....	13	7,986,543 dollars	1954
<u>Livestock on farms</u>			
All cattle and calves.....	27	13,500 head	1954
Milk cows.....	34	710 head	1954
Hogs.....	19	1,722 head	1954
Chickens.....	37	10,807 birds	1954
Horses and mules.....	27	492 head	1954
Sheep and lambs.....	35	303 head	1954
<u>Dairy and poultry products sold</u>			
Value of dairy products sold.....	35	59,282 dollars	1954
Whole milk sold.....	35	848,000 pounds	1954
Value of poultry products sold....	38	22,685 dollars	1954
Chickens sold.....	37	4,353 birds	1954
Eggs sold.....	37	42,247 dozen	1954
<u>Important crops harvested</u>			
Wheat.....	10	74,800 acres	1954
Barley.....	7	27,900 acres	1954
Green peas.....	4	4,400 acres	1954
Alfalfa.....	26	1,160 acres	1954
Dry peas.....	10	178 acres	1954

Sources: U. S. Census, Agriculture, 1954.

U. S. Census, Population, 1950.

Washington State Census Board

Estimate 1954

U.S.D.A., AMS, Agricultural Estimates
Division